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ABSTRACT

Early predictors of two major areas of teenage outcome -- substance use and psychiatric symptoms -- were analyzed and specific developmental paths leading to each teenage outcome were identified in this long-term, follow-up study. Substance "use" rather than "abuse" and psychiatric "symptoms" rather than "illness" were investigated. Interviews were conducted with 939 of the black mothers or mother surrogates who had participated in the 1966-67 Woodlawn study. If mothers consented, their adolescent children were approached for reassessment. A total of 705 black teenagers were reassessed. Through the use of log-linear models and chi-square tests of significance, relationships were sought between measures of first grade social adaptational status (shyness, aggressiveness, learning problems, and cognitive ability), first grade psychological well-being, teenage psychiatric symptoms, and teenage use of cigarettes, marijuana, hard liquor, and beer and wine. Results, including indications of specific paths leading to substance use and to psychiatric symptoms among Woodlawn teenagers and significant sex differences in these outcomes, are discussed. (Author/RH)

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PATHS LEADING TO TEENAGE PSYCHIATRIC SYMPTOMS AND SUBSTANCE USE: DEVELOPMENTAL EPIDEMIOLOGICAL STUDIES IN WOODLAWN

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Psychopathology and the use of substances such as tobacco, alcohol, and drugs are two key areas of concern during adolescence in our society. In this paper we examine the developmental paths from childhood (in particular, from first grade) to adolescent outcomes in these two domains. Since males and females differ in the degree and type of psychopathology and substance use, we examine the developmental paths separately for each sex.

Kohn (1976) points out that the absence of research on sets of behavioral and social outcomes has inhibited the development of theories which both explain specific outcomes and provide a more general understanding of a group of outcomes. Different outcomes must be studied simultaneously in order to understand whether antecedents discovered for one are specific to it or are general antecedents leading to a broad variety of outcomes. Both causal modeling and, ultimately, the design of prevention programs would be furthered by understanding the early antecedents and paths leading to substance use and to psychiatric symptoms.

The two categories of outcome we study here are drawn from the two dimensions of mental health which are central to the Woodlawn studies: psychological well-being (PWB) and social adaptational status (SAS). By separating these two conceptually distinct areas we can study the outcomes of each as well as their evolving interrelations over the significant portion of the life-span from early childhood to mid-adolescence.

This research is not solely social, nor biological, nor psychological, but instead assumes that all are together involved in the origins of behavior. Social adaptation in particular focuses attention on social task demand and adaptational response, response which is

guided and ultimately limited by the individual's "capacity for adaptive innovation", as Paul Weiss, the biologist, has put it (1949).

Social Adaptation and Psychological Well-Being: A Two-Dimensional Concept of Mental Health

Mental health has two distinct aspects, which can be conceptualized and measured separately. From the standpoint of each individual, mental health is an internal feeling of well-being, related to the thought processes, affective status, self-esteem, and other aspects of the individual's psychological status. This is the aspect of mental health we call psychological well-being (PWB). It is measured by behaviors thought to reflect aspects of the internal state. Some investigators infer from specific behaviors the psychological state of the individual, while others deny the need for such inferences and prefer to build theories of behavior without attempting to discern the nature of the psyche. Certain behaviors are termed symptoms; certain aggregates of symptoms are termed syndromes or disorders; again, investigators differ on the best representation of the data. Nevertheless, all of these concerns center on the behavior of the individual.

From the standpoint of society, however, mental health consists of the adequacy of the individual's role function in the major social fields appropriate to his or her place in the life cycle. This is the aspect of mental health we call social adaptational status (SAS). Society's ratings of adequacy--i.e. social adaptational status ratings--are in such terms as pass vs. fail, or promoted vs. fired. These are obviously not the same as the symptoms of depression, for example, which may precede or succeed the social adaptational status ratings.

The life course-social field concept underlies our notion of SAS and has guided the specific form of our longitudinal research, in particular our interest in the first-grade classroom (Kellam et al. 1975). Following the work of theoreticians such as Havighurst (1952), Erikson (1959, 1963), Parsons (1964), and Neugarten (1979), we view individuals as passing through vaguely demarcated stages of life and as being involved with one, two, or a few major social fields at each stage of life. At each stage of life each social field contains natural raters who define the social tasks required in that social field and rate the individual's performance. The assessment of the individual's performance in a social field by such a natural rater constitutes the individual's social adaptational status.

The natural rater sometimes assesses individuals formally, as first-grade teachers do with grades and tests. Parents are less formal but equally authoritative. The supervisor on the job and significant others in the peer group are additional examples of natural raters important at different stages of life.

As noted previously, we view the outcomes studied in this paper as aspects of PWB (psychiatric symptoms) and SAS (substance use). Although, as we explain below, our data on substance use are based on self-reports rather than assessments by natural raters, we view substance use behavior as an aspect of SAS because of its social significance within the peer, family, and school social fields--all important in adolescence--and because it is an area where society, as represented in the legal system, takes a spectrum of views ranging from mild acceptance, as of cigarettes, to severe condemnation, as of "hard drugs."

The childhood antecedents that we report on here also represent aspects of PWB and of SAS. In studying childhood SAS, we focus on adaptation to the first-grade classroom, which is the scene of the first major, legally required transition from home to school.

Since we have measured SAS and PWB separately, we can investigate their interrelations over time and the long-term outcomes of each. Our past findings suggest that first-grade SAS has particularly important long-term predictive and possibly developmental significance for adolescence (Kellam et al. 1975; Kellam, Brown, and Fleming in press; Kellam et al. in press; Kellam, Ensminger, and Simon 1980; Kellam, Simon, and Ensminger in press; Ensminger, Kellam, and Rubin 1981; Ensminger, Brown, and Kellam in press).

The Woodlawn Study Population

The data studied here were gathered prospectively on total consecutive first-grade cohorts of the mid-1960's in Woodlawn, a poor black community on the South Side of Chicago. Between 1964 and 1969 we made assessments of the mental health of all the first-graders in Woodlawn at several points in each school year. We further assessed samples of these children in third grade. We also conducted interviews in the spring of 1965 and the spring of 1967 with the mothers (or mother surrogates) of the children who were in first grade in those two years. We received support for all of these research ventures from a community board composed of leaders from the community's larger citizen organizations. The support and assistance of the board has been essential throughout the course of this work (Kellam & Branch, 1971; Kellam et al. 1972).

For the long-term follow-up studies, the target population has been the entire first-grade population of 1966-1967, the 1,242 students who remained in the Woodlawn first-grade classrooms that school year, together with their families. By 1975, when we began our search for families for the follow-up, over two-thirds of this group no longer lived in Woodlawn. About 8 of every 10 of the mobile families lived in areas with better housing and higher median incomes.

In 1975-1976, we located and reinterviewed 939 (75 percent) of the mothers or mother surrogates of the 1,242 families from the 1966-67 study. The mothers' refusal rate was 5.9 percent. An additional 18.5 percent of mothers were not reinterviewed because we could not find them, because the families had moved from Chicago, or because their children from the study population had died. We asked those mothers who consented to the interview for permission to interview the teenagers. If the mother gave her permission, we approached the teenager for reassessment. Of the 939 teenaged children of the reinterviewed mothers, 75 percent (705) participated in the reassessments, 14.5 percent refused to participate, and 10.4 percent had moved out of Chicago or were unavailable because they were in an institution or had unknown addresses. The study population for this chapter consists of the 705 teenagers whom we reassessed.

To study differences between those reassessed and those not reassessed, we compared three groups from the original population: (1) children who participated in the follow-up as teenagers, all of whose mothers (or mother surrogates) also participated; (2) children who did not participate but whose mothers did; and (3) children who did not participate and whose mothers also did not. We found, among the groups,

no differences in children's or mothers' 1966-1967 psychological well-being, family income, kinds of adults at home, or welfare status. The third group was more likely to have begun child rearing in adolescence, had been somewhat more mobile before and during first grade, and more likely to have been in parochial school in first grade. It was harder to trace parochial school students because the parochial schools do not maintain centralized and computerized records as do the Chicago Public Schools.

We found significant differences in only 3 of 21 first-grade measures of the children's social adaptation. Those measures which we examined included IQ and school readiness test scores, along with a set of teacher ratings of each child's functioning as a student. Only maturity, as assessed by teachers early in first grade, and the grade point averages for both semesters of first grade were different. All three differences were small, and the other 18 measures did not provide any indications of important trends which the 3 significant differences might be signalling. We conclude that the population of teenagers we assessed for most analyses does not differ substantially from the groups we did not assess except in terms of mother's age at first birth, early mobility, and parochial school enrollment. (For further information on the follow-up methods see Agrawal et al. 1978 and Kellam, Simon, and Ensminger in press.)

In community epidemiological studies of adolescent outcomes, such as the Woodlawn project, we can hold the broad characteristics of the community constant, while we focus on the effects of variation in families, in classrooms, in schools, and in the other local social contexts. Rates of psychiatric distress and of substance use, as well

as relationships to important determinants, may vary from one kind of community to the next. Community studies thus complement larger population studies on a more macro level. Micro-level laboratory studies, with carefully drawn samples and hypotheses based on community epidemiological studies, will be increasingly important in understanding the effects of early predictors on teenage and adult outcomes. Replication of results from such studies as the Woodlawn investigations is important and must be done in similar and different kinds of communities as part of the long-range research strategy.

Longitudinal Studies of Predictors of Psychiatric Symptoms and Substance Use

Because of the importance of prospective longitudinal research in the areas this paper treats, this review will mainly focus on studies employing such a design. We first summarize findings on antecedents of psychiatric symptoms. We divide the antecedents between our categories of PWB and SAS. We then deal with studies of antecedents of substance use in the same way. We have tried to bring out findings on sex differences since this is one of our major concerns.

Predictors of Teenage and Adult Psychiatric Symptoms

PWB predictors. A variety of childhood symptoms and syndromes appear to be related to later psychopathology, but few such childhood conditions exhibit either clear continuity or a clear developmental path to a specific, although different, outcome. Organic brain dysfunction and brain damage seem to lead to a variety of later disorders in both sexes (Rutter, Tizard, and Whitmore 1970; Warren 1965; Shaffer et al. 1979; Watt 1974). Hyperactive children may be more nervous, restless,

temperamental, impulsive, depressed, or lacking in self-esteem than control children at adolescent or adult follow-up (Borland and Heckman 1976; Milich and Loney 1979; Stewart, Mendelson, and Johnson 1973; Hechtman et al. 1981). These studies did not include enough females in the sample to provide firm conclusions about sex differences in the later outcome of hyperactivity.

Several studies have found that early neurotic syndromes do not clearly predict later neurotic syndromes (Rutter 1972; Pritchard and Graham 1966; Warren 1965; Robins 1966). Nevertheless, many of the symptoms associated with neurosis do appear to signal later psychological problems including neurotic symptoms, and, in some cases, psychoses. Two studies found early cheerlessness or depression to be an antecedent of schizophrenia for males (Robins 1966; Watt 1974). Childhood nail biting, worrying, and specific fears seem to predict a number of later outcomes, including adult anxiety in both sexes (Pritchard and Graham 1966) and schizophrenia among males (Robins 1966). In the Woodlawn population, a mixed measure of childhood anxiety and depression ("worried and sad") predicted high self-ratings of various symptoms for adolescent females. Trouble with feelings in childhood also predicted these symptom ratings for the females in our population (Kellam, Simon, and Ensminger in press). Emotional instability in children predicted later schizophrenia in one study, but the quality of early behavior differed between girls and boys. While "cheerless, emotional" behavior was an antecedent among males, "calm, insecure, immature" behavior predicted for females (Watt 1974). Another study linked "lack of malleability" to later psychiatric disorder in both sexes (Graham, Rutter, and George 1973). Somatic symptoms and muscular

tension in childhood seem also to be somewhat related to later psychological problems, both in the Woodlawn population (Kellam, Simon, and Ensminger in press) and elsewhere (Robins 1966).

SAS predictors. Early social maladaptation appears to predict various psychological outcomes in adolescence and adulthood quite strongly. Numerous studies, including some on the Woodlawn population, have linked early learning difficulties to later psychiatric problems. Learning problems have been shown to be related to later schizophrenia (Watt 1974) and depression (Kellam, Brown, and Fleming in press, a Woodlawn study) in males, and to paranoid feelings in females (Robins 1966).

IQ, which we consider to be a quasi-SAS measure when it is tested under loosely controlled conditions in a classroom for institutional purposes, is related to many later psychological problems. Shaffer et al. (1979) linked low childhood IQ to later general psychiatric disorder. Rutter, Tizard, and Whitmore (1970) found that early low IQ led to "neurotic disorder" in females but to "antisocial disorder" (a social adaptational rather than psychological problem) in males. One study presented evidence that above-average IQ increased the chances of a positive outcome for autistic children of either sex (Stewart and Gath 1978). In the Woodlawn population, higher first-grade IQ scores seem to be linked to fewer self-reported psychiatric symptoms ten years later (Kellam, Simon, and Ensminger in press).

Early aggressive and antisocial behavior strongly predict many later psychological problems, according to many studies. (In the Woodlawn studies, however, we have found aggression to predict only adaptational, not psychological problems.) Such behavior seems to be

one predictor of later schizophrenia for males (Watt 1978; Robins 1966) and of sociopathic personality for both sexes (Robins 1966). Robins (1966) found that specific forms of early antisocial behavior had specific outcomes. Incorrigibility, staying out late, and pathological lying were related to later sociopathy in both sexes. This particular later outcome was also related in her data to early theft (more strongly for males) and early sexual problems for females.

Predictors of Substance Use

PWB predictors. A number of researchers have found that early psychological distress predicts substance use (Smith and Fogg 1978; Paton, Kessler, and Kandel 1977; Kaplan 1975). In the Woodlawn study population, however, a previous study found no effect for males and one in the opposite direction for females: psychiatric symptoms in first grade were weakly associated with less substance use ten years later (Ensminger, Brown, and Kellam in press).

One important set of psychological variables includes the individual's cognitive and affective orientation toward drug use and society's views thereof. Perceived use by others is an important predictor (Jessor and Jessor 1978; Robins, Davis, and Wish 1977; Kandel, Kessler, and Margulies 1978). Not too surprisingly, Kandel, Kessler, and Margulies (1978), Sadava (1973), and Smith and Fogg (1978) have established that favorable attitudes toward substance use predict use. In general, attachment to or alienation from the dominant values of society shows a consistent relationship to substance use (Jessor and Jessor 1978; Sadava 1973; Smith and Fogg 1978; Kandel, Kessler, and Margulies 1978).

SAS predictors. One major group of adaptational predictors includes measures of performance in school. It is not yet clear, however, what exactly is the relationship of academic achievement to substance use. A number of investigators have reported that poor high school performance is a common antecedent of substance use (Jessor and Jessor 1978; Kandel, Kessler, and Margulies 1978; Smith and Fogg 1978). In contrast, a study by Mellinger et al. (1978) indicated that college students with higher grade point averages smoked marijuana more often. Another study that at least confirms that the relationship of substance use to school achievement is complex reported that high school students who used marijuana and hallucinogens tended to have lower grades, but higher general intelligence (Johnston 1973). Previous studies of the Woodlawn data found that teacher-rated learning problems in first grade were not related to substance use ten years later, but that performance on first-grade readiness and IQ tests was: those first-graders with higher test scores developed into adolescents with higher substance use (Kellam, Ensminger, and Simon 1980). This relation was true for both sexes.

A number of studies have found that various measures of social passivity were related to lower substance use. Smith and Fogg (1978) found that ratings of obedience by both self and peers were among the best criterion variables in a discriminant analysis of nonusers, early users, and late users of marijuana. They also found that peer ratings of "tenderness" were related negatively to the initiation of use. Previous studies of substance use by the Woodlawn population found that males rated shy by first grade teachers were significantly less likely to use cigarettes and marijuana ten years later (Kellam, Ensminger, and

Simon 1980). There were weak trends in the same direction for hard liquor and beer or wine. None of these results was statistically significant for females.

Aggressive or antisocial behavior may be the most frequently replicated predictor of substance use (Johnston 1973; Johnston, O'Malley, and Eveland 1978; Kandel, Kessler, and Margulies 1978). Robins (1978) summarizes her and her colleagues' consistent findings from three independent investigations of the relation between childhood and adolescent antisocial behavior on the one hand and adult outcomes on the other (Robins 1966; Robins and Murphy 1967; Robins, Davis, and Wish 1977). She reports that, across all study populations, there was a reliable association of early fighting, truancy, arrests, and drinking with adult alcoholism and drug abuse. The Woodlawn studies have supported these findings, but only for males. Males rated aggressive by their first grade teachers were significantly more likely to be substance users ten years later (Kellam, Ensminger, and Simon 1980). Furthermore, teenage antisocial behavior appeared to be a significant mediator of the effect of early aggressiveness for those males who were both shy and aggressive and, to a lesser extent, for those who were aggressive but not shy.

One result of the Woodlawn studies that has not to our knowledge been reported elsewhere has been that those males who are both shy and aggressive in first grade form a special population. Rather than falling between the shy non-aggressives and the aggressive non-shy groups in levels of use, the shy-aggressives appears to have the highest rate of use of all (Kellam, Ensminger, and Simon 1980). Investigating this finding is one of this paper's tasks.

Description of Measures

First-Grade Social Adaptational Status

Our primary instrument to measure SAS was the Teacher's Observation of Classroom Adaptation (TOCA). The instrument contained five rating scales measuring different social tasks the child was expected to perform: social contact, authority acceptance, maturation, cognitive achievement, and concentration. In addition, TOCA contained a global scale of how well the child was doing as a student. During a standardized interview, each teacher rated her students on each social task on a 4-point scale running from adaptive to severely maladaptive behavior. Teachers made TOCA ratings at first quarter in the 1966-1967 school year, at midyear, at year end, and again in third grade. Reliability and validity data for these scales are reported in Kellam et al. (1975).

In the analyses to follow, the TOCA scales are treated as categories and collapsed to produce three maladaptive patterns of responding, each with three levels (not at all, mild, and moderate or severe). The three patterns are: shyness (failure to make social contact, e.g. not speaking up, having few friends, sitting alone); aggressiveness (failure to accept authority, e.g. breaking rules, fighting, lying); and learning problems, where the score consisted of the most severe rating given by the teacher in cognitive achievement (learning up to ability as the teacher perceives it), maturation (acting with sufficient independence to accomplish first-grade tasks), and concentration (paying attention for a sufficient span of time to allow for teaching and learning). This approach to learning problems is similar to Kohn and Rosman's (1972) concept of task orientation and to a learning problems category developed by Lambert and Nicoll (1977).

In addition to the teacher ratings of shyness, aggressiveness, and learning problems, we will also summarize how teenage outcomes were related to the first-grade children's performance on the Metropolitan Readiness-For-School Test and the Kuhlmann-Anderson IQ test, both administered in first grade by the Chicago Board of Education. We view these tests as quasi-SAS measures, as the schools use them in evaluating the potential and performance of students.

First-Grade Psychological Well-Being

Data on psychological well-being were collected from structured clinical observations, from the mothers, and from children in third grade. We will discuss only the first grade measures in this chapter. The Mother Symptom Inventory (MSI), completed by the mothers in the home interview in 1966-1967, was a 38-item inventory adapted from previous investigations of the epidemiology of symptoms among children (Kellam et al. 1975). The mothers were asked to rate their children on each symptom on a 4-point scale from "not at all" to "very much." These 38 items as used here are combined into a single construct. While unaware of the teachers' ratings, mothers may have been aware of teachers' views of the children's social adaptation.

We also obtained measures of psychological well-being from Direct Clinical Observation (DCO). At both the beginning and the end of first grade, pairs of clinicians (a male and a female) observed groups of 10 children, five girls and five boys, randomly drawn from each classroom, and in standardized group play situations rated each child on six symptoms (Kellam et al. 1975). For this analysis we have grouped all

children who were rated as other than "not sick" by either clinician as having "signs of symptomatology" and contrasted them with the large majority of children who had no such signs.

Teenage Substance Use

The information on teenage drug use that we use in this chapter comes from responses to items in What's Happening?, a questionnaire administered to the teenagers who participated in the follow-up sessions. The questions concerned the frequency of use of 12 categories of substances, including alcohol and cigarettes. The teenagers indicated frequency of their use of these substances (1) during the previous two months and (2) ever. For the analyses in this chapter, we use only responses to the "ever" question. We discuss 4 categories of substances: (1) beer or wine, (2) hard liquor, (3) cigarettes, and (4) marijuana or hashish. The questionnaire also asked about the use of drugs such as psychedelics, uppers, downers, tranquilizers, cocaine, inhalants, heroin, and codeine, but the respondents used these drugs too infrequently for us to study their antecedents here.

For all categories except cigarettes, rate of use was broken into three categories: (1) never used, (2) used 1 to 19 times, and (3) used 20 times or more. Cigarette use was broken into: (1) never used, (2) used 1 or 2 times or occasionally, (3) used regularly.

The questionnaires were administered by two black college students to adolescents in groups of five to eight. The college students rotated partners and the leadership role. The assessment questions were presented visually on slides and orally on audiotape to control for

reading ability differences and to standardize the pace and the general administration of the questions (Petersen and Kellam 1977). The group process in which the data were gathered focused on the trust issue, allowing the adolescents to express their fears and questions. During the administration, the assessors stopped the slides and tape whenever a teenager had questions about either the purpose or the meaning of the items. Confidentiality of responses was emphasized.

We do not know how often teenagers underreport or overreport their substance use, but others have shown self-reports to be reasonably complete when validated by urinalysis following interview or medical records (Robins, 1973). One study showed that the claims were not inflated, as respondents did not claim to have used a fictitious drug (Josephson, Haberman, and Zanes, 1971). Our efforts to encourage the trust and interest of the respondents in the research and to guarantee confidentiality probably mean that reports in the current study were as valid as in those previous studies. The general agreement in the ranks of specific drugs in popularity with their ranks in other studies supports this view.

The pattern of drug use in the Woodlawn teenagers was heavily centered on beer or wine, hard liquor, marijuana, and cigarettes (Kellam, Ensminger, and Simon 1980). Males used significantly more beer or wine, hard liquor, and marijuana than did females. There were no significant sex differences in the rates of cigarette use and the use of illicit drugs other than marijuana.

Overall, both males and females reported frequent substance use. More than one-third of the males and about one-sixth of the females reported using marijuana and beer or wine 20 times or more. Fewer used

hard liquor frequently, but 47 percent of males and 38 percent of females had used it at least once. Rates of use of illicit drugs other than marijuana were low. Only 1 percent had tried heroin. About 8 percent reported using cocaine at least 1 time, while 12 percent reported using unprescribed codeine.

Teenage Psychiatric Symptoms

The psychiatric symptom constructs employed in this chapter are based on factor analyses of the 49 items chosen to represent six a priori constructs in the How I Feel questionnaire administered to the 16- or 17-year-old teenagers. This instrument was administered in the same session as the What's Happening? instrument, which was described above. Psychometric examination of these original constructs is presented in Petersen and Kellam (1977).

We used exploratory maximum likelihood factor analysis to check whether the data confirmed the existence of these constructs. We examined 7-factor through 10-factor solutions for the original set of 49 items for males and females separately. These analyses suggested that there were more than 6 factors (7 for males and 8 for females), but 1 of these for males and 2 of these for females did not appear to be meaningful.

A list of items to be included in the construct based on each of the six meaningful factors first included those items loading at 0.35 or greater in the promax-rotation factor solutions. Next, those items appearing in more than one list were deleted. Finally, to remain on the list, an item had to be more highly correlated on the average with the

items on its own factor list than with the items in the other factor lists.

The resulting lists of items, together with the names we adopted for the factors, appear in table 1. They resemble closely the original six a priori symptom constructs. We subsequently deleted the Anger Outward factor, because it was made up entirely of self-reports of aggressive behavior, which we felt made it more of an SAS measure.

Table 1 goes about here

We next examined differences between males and females in the structure of the five remaining factor-based psychopathology constructs. The test for equality of covariance matrices for the items defining the five factors indicated that significant differences existed between males and females. Using confirmatory maximum likelihood analysis (Jöreskog, 1971) we tested for differences in factor loadings for males and females, allowing the five factors to be intercorrelated and the error variances for each of the items to be different for males and females, but allowing each of the items to load only on the factor to which we had assigned it. The results of this analysis showed only small differences in the factor loadings for males and females (although they were statistically significant), thus justifying the use of the same set of items in each construct for males and females.

Besides these measures of specific symptoms, we also constructed a measure of overall distress using Rasch's psychometric model (Wright 1977). The Rasch model provides a method for obtaining scale values for persons and items on an underlying, unidimensional trait, in this case,

TABLE 1

Item List for the Six Factor-Based Symptom Constructs

I. Anger Outward

1. When I get angry I stay angry.
2. If someone insults me I am likely to hit him.
3. I yell at people.
4. I lose my temper.
5. I get into fights.

II. Anxiety

1. I feel nervous.
2. I feel under pressure.
3. I feel tense.
4. New situations make me tense.

III. Depression

1. I feel sad.
2. I cry and don't know why.
3. I feel hopeless.
4. I feel ashamed of myself.
5. I feel guilty.
6. People would be better off without me.

IV. Bizarreness

1. I sometimes hear strange things when I am alone.
2. I sometimes think the world is ending.
3. I sometimes hear voices or sounds others don't.
4. Weird, odd and strange things happen to me.

V. Paranoia

1. People hide from me what they really feel.
2. People have turned against me.
3. People talk behind my back.

VI. Obsessive/Compulsive

1. When things are not neat and orderly, I feel upset.
2. If things are not just a certain way, I feel upset.

that of overall psychological distress. The Rasch model yields tests of fit of items to the unidimensional model. On the basis of these tests we eliminated 14 items from the original set; the remaining 35 fit the model well and yielded Rasch scores of overall distress ranging from -4 to +4.

All analyses of the teenage symptom constructs use dichotomies based on either summed scores of the items listed in Table 1 or on the Rasch score. A high symptom score is defined as any score more than one-half standard deviation above the mean for the entire sample of 705 teenagers. A low symptom score is any score below that value.

Results

Methods

In the research presented here we have used different methods than previously. In the previous studies of substance use, summarized in the literature review, we used multivariate analysis of variance in which the children were placed in eight typal categories based on their TOCA ratings (Kellam, Ensminger, and Simon 1980). These analyses suggested that shyness and aggressiveness predict substance use, while learning problems predict psychiatric symptoms. In order to examine these questions specifically here, we have treated these antecedents, as well as the outcomes, as categorical variables and used log-linear models for frequency tables (Goodman 1971; Bishop, Fienberg, and Holland 1975; Haberman 1977). Such models also allow for non-linear relations between antecedents and outcomes. In order to make our studies as comparable as possible across outcomes, we have examined models for each outcome with

identical sets of antecedents. The major difference was that, as described above, substance use outcome measures were trichotomies, and psychopathology outcome measures were dichotomies.

As noted by Goodman (1971, 1972), the type of log-linear models we use are similar to more traditional modified regression models for the "logits" of our categorical outcome measures. In each case we examine first a model fitted on the hypothesis that the outcome is independent of the antecedents, and then use a forward selection method to choose the model that includes the set of effects of antecedents on outcome that best fits the data (Goodman 1971). The statistical tests used in assessing the models and effects are based on the likelihood ratio chi-square statistic. The chi-square for a model tests the hypothesis that the observed values differ from the fitted values by chance alone; hence a low statistic (with a high p-value) indicates a good fit. The chi-square for an effect tests the hypothesis that the improvement in fit due to adding a given antecedent to the equation for the outcome is due to chance alone; hence a large statistic (with a low p-value) indicates that an effect is statistically significant.

We first present the effects of early SAS on the two categories of teenage outcome, psychiatric symptoms and substance use respectively. For each outcome we first examine the joint effects of the three TOCA measures of shyness, aggressiveness, and learning problems in the first-grade classroom. Next we examine the effects of first-grade readiness and IQ scores in conjunction with those TOCA measures that have been shown to be significant predictors.

Finally we examine the effects of early PWB on the two outcome categories. For each outcome we analyze the relation of both the Mother

Symptom Inventory (MSI) and Direct Clinical Observation (DCO) to outcome, both alone and in conjunction with significant SAS predictors.

Social Adaptational Status in First Grade and Teenage Psychiatric Symptoms

Shyness, aggressiveness, and learning problems. First we examine the results for teenage psychiatric symptoms. Table 3 presents both the independence and best-fitting models for the antecedents of the six symptom measures described above. Early learning problems showed the clearest relationship to teenage symptoms, particularly for males. First-grade learning problems were associated with three of the five specific symptom measures for males and two for females (See Table 2). In addition first-grade learning problems predicted overall psychological distress (as derived from the Rasch score) for both males and females. Figure 1 shows the proportion of teenagers reporting heavy symptoms at each level of first-grade learning problems. For instance, thirty percent of males who had had learning problems in first grade rated themselves as high on depression 10 years later, while only thirteen percent of males without learning problems in first grade had high depression scores later.

Table 2 and Figure 1 go about here

Shyness in first grade also appeared to predict later anxiety in males. Thirty-seven percent of the males who were moderately or severely shy in first grade reported anxious feelings as teenagers, as

compared to twenty percent of the non-shy males. Shyness in first grade was related in the same way to the level of symptoms of bizarreness in females.

There was some evidence of a three-way association of shyness, learning problems, and bizarreness among females, but the result is not clearly interpretable and is probably due to chance. The same is true for paranoia in males. Notably absent was any association between early aggression and teenage symptoms.

MRT and IQ. Previously, we had found that the two first-grade measures of MRT and IQ were related to the overall level of symptoms for these teenagers (Kellam, Simon, and Ensminger in press). In further research, we examined the effects of these variables on symptoms in the presence of shyness and learning problems, the other antecedents of teenage psychiatric symptoms, and found that the effects persisted undiminished. Table 3 summarizes the relationships of MRT to the symptom constructs and the overall distress measure. The results for IQ were similar. Among females both IQ and MRT had strong negative relatinos to obsessive compulsive symptoms; higher scores on the girst grade tests were associated with lower self-reports of symptoms ten years later. Overall distress among females, however, showed a more complex relation: the incidence of teenage distress decreased as from the most immature first-graders to the low normal and average group, but the above average group showed considerably more distress than the average. Among males the picture was similarly mixed: teenage depression decreased among those who had been more ready for first grade, while anxiety was higher among the above average than the average. It appears that, while good performance on first grade

Table 2

Summary of Log-Linear Analyses of the Relationships between First-Grade Aggressiveness (A), Shyness (S), Learning Problems (L), and Teenage Symptoms (S_x)

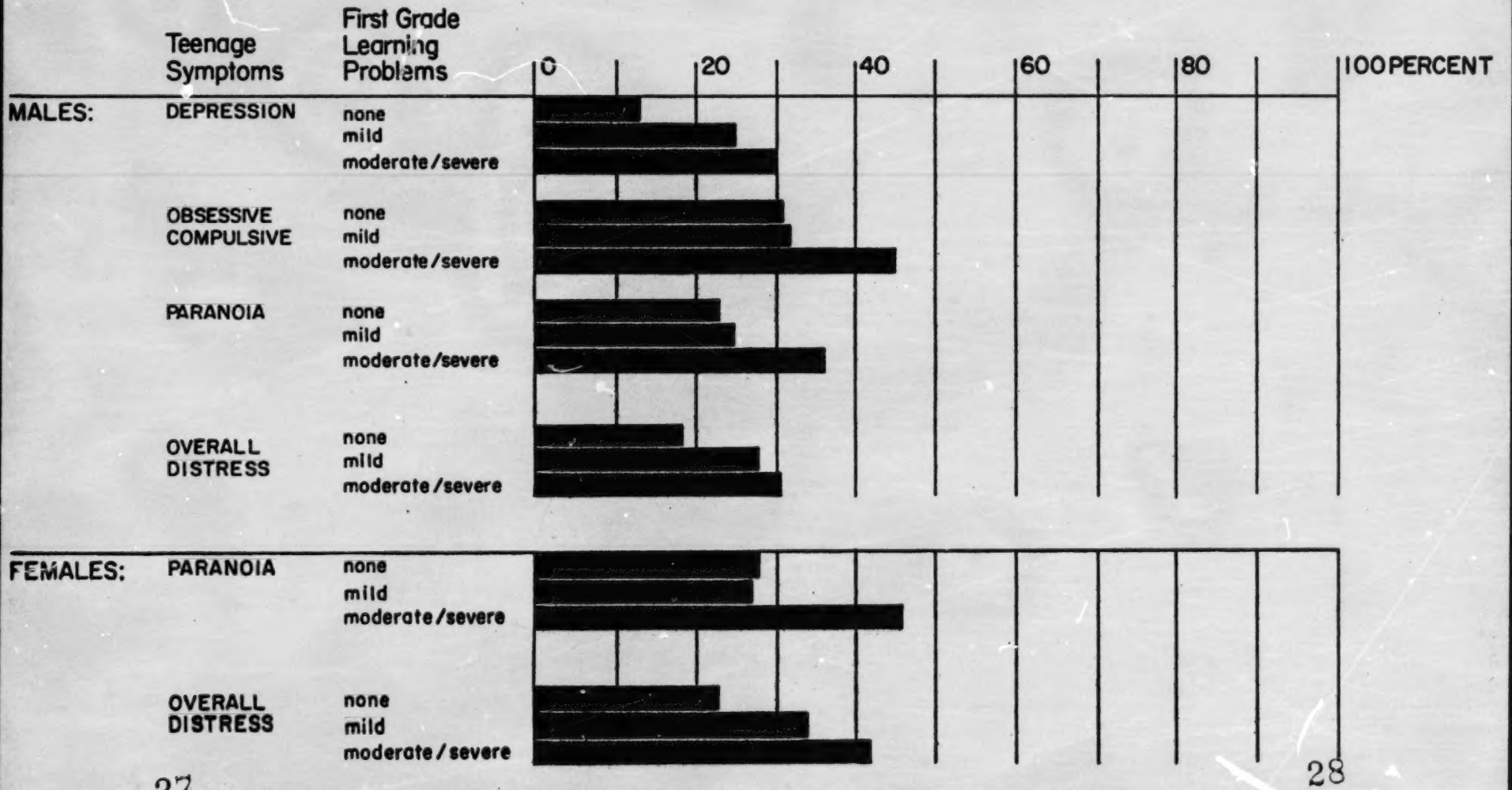
	Males				Females			
Teenage Symptom Category	Independence Model and Best-Fitting Model	χ^2	df	p	Independence Model and Best-Fitting Model	χ^2	df	p
Anxiety								
Models	$(S_x)(ASL)$	19.29	23	.68	$(S_x)(ASL)$	20.84	21	.47
	$(S_xS)(ASL)$	13.22	21	.90				
Effects	Shy (S)	6.17	2	.04				
Depression								
Models	$(S_x)(ASL)$	35.56	23	.05	$(S_x)(ASL)$	23.35	21	.33
	$(S_xL)(ASL$	23.88	21	.30				
Effects	Lrn prob (L)	11.68	2	.003				
Paranoia								
Models	$(S_x)(ASL)$	33.61	23	.07	$(S_x)(ASL)$	34.96	21	.03
	$(S_xLS)(ASL)$	15.74	15	.40	$(S_xL)(ASL)$	25.62	19	.14
Effects	Lrn prob (L)	6.13	2	.05	Lrn prob (L)	9.34	2	.009
Bizarreness								
Models	$(S_x)(ASL)$	30.98	23	.12	$(S_x)(ASL)$	31.01	21	.07
					$(S_xLS)(ASL)$	10.60	15	.78
Effects					Shy (S)	5.95	2	.05
					Lrn prob (L)	6.89	2	.03
					L * S	7.57	2	.02
Obsessive-Compulsiveness								
Models	$(S_x)(ASL)$	38.92	23	.02	$(S_x)(ASL)$	22.12	21	.39
	$(S_x)(ASL)$	32.69	21	.05				
Effects	Lrn prob (L)	6.23	2	.04				
Overall Distress								
Models	$(S_x)(ASL)$	33.01	23	.08	$(S_x)(ASL)$	42.99	20	.002
	$(S_xL)(ASL)$	27.64	21	.15	$(S_xL)(ASL)$	32.53	18	.02
Effects	Lrn prob (L)	5.37	2	.07	Lrn prob (L)	10.46	2	.005

NOTE: Overall distress is measured by Rasch modelling. Degrees of freedom (df) are reduced to account for empty cells; for example, severe shyness is always accompanied by learning problems.

Figure 1

Learning Problems in First Grade and Teenage Psychiatric Symptoms

MALES:	none	N = 137
	mild	N = 88
	moderate/severe	N = 116
FEMALES:	none	N = 194
	mild	N = 82
	moderate/severe	N = 83



cognitive achievement tests may lead to fewer symptoms of certain types ten years later, the highest levels of performance may lead to additional stress.

Table 3 goes about here

One group we hypothesized to be at high risk for symptoms includes those first graders who were not performing up to their abilities. We define underachievers as students with high MRT scores but also learning problems. These children showed no special risk of later symptoms; the percent symptomatic 10 years later was neither as high as those with only learning problems in first grade nor as low as those with high MRT scores in first grade.

Social Adaptational Status in First Grade And Teenage Substance Use

Shyness, aggressiveness, and learning problems. In log-linear analyses similar to those with which we examined the antecedents of teenage psychiatric symptoms, we found very different antecedents of teenage substance use. Shyness and aggressiveness, but not learning problems, were important predictors for males (See Table 4). These results, displayed in Figures 2 to 4, can be summarized as follows. Aggressiveness increased the likelihood of males' use of all four substances. Shyness without aggressiveness, in contrast, significantly inhibited marijuana and cigarette use, and showed such trends in the case of beer or wine and hard liquor. Shyness and aggression in combination, however, were associated with heavy cigarette use by males.

Note that neither teacher ratings of shyness, nor aggressiveness, nor learning problems showed any relationship to substance use by females.

Table 4 goes about here

Figure 2 shows the percentages of males by level of first-grade aggressiveness who became heavy users or had never used these substances. For all four substance categories the aggressive males were about 1 1/2 times as likely to be heavy users than were males rated not aggressive. Similarly, many fewer aggressive than non-aggressive males were non-users.

Figure 2 goes about here

Compared to non-shy males only one third as many of the moderately or severely shy first-graders became heavy users of marijuana, and only one sixth as many became heavy users of cigarettes (See Figure 3). A large majority of the shy males had never tried marijuana as teenagers.

Figure 3 goes about here

Shyness without aggressiveness also appeared to inhibit use of alcohol, but the results were not as strong statistically.

Shyness, however, appears not to have had an inhibiting effect in the presence of aggressiveness. Indeed, the combination appears to enhance use. Figure 4 shows this effect by comparing teenage males who had been both shy and aggressive in first grade to those who had been

Table 3

First Grade Metropolitan Readiness Test (MRT) Scores

and Percent Symptomatic* Teenagers Ten Years Later

Males

First-Grade MRT Scores

Teenage Symptoms	Immature (N=62)	Low Normal (N=173)	Average (N=75)	Above Average (N=34)
Anxiety**	35.5***	23.4	13.3	23.5
Depression**	33.9	21.2	16.0	11.8
Bizarreness	30.7	27.0	26.7	23.5
Paranoia	37.1	26.3	22.7	23.5
Obsessive-Compulsive	45.2	37.2	29.3	29.4
Overall Distress**	37.1	25.6	14.7	14.7

Females

First-Grade MRT Scores

Teenage Symptoms	Immature (N=53)	Low Normal (N=114)	Average (N=114)	Above Average (N=41)
Anxiety	28.3	29.8	28.1	39.0
Depression	35.9	31.6	22.8	31.7
Bizarreness	30.2	35.1	38.6	24.4
Paranoia	39.6	34.2	29.0	29.3
Obsessive-Compulsive**	50.9	46.5	35.1	24.4
Overall Distress**	49.1	29.0	22.8	36.6

* Symptomatic Teenagers are those with scores greater than one-half standard cleviation above the population mean.

** p .05

*** The numbers in the table are the percent of the teenagers within each level of MRT who are symptomatic.

Table 4

Summary of Log-Linear Analyses of the Relationships between First-Grade Aggressiveness (A), Shyness (S), Learning Problems (L), and Teenage Drug Use (D)

	Males				Females			
Drug Category	Independence Model and Best-Fitting Model	χ^2	df	P	Independence Model and Best-Fitting Model	χ^2	df	P
Beer								
Models	(D)(ASL)	57.62	46	.12	(D)(ASL)	30.77	42	.90 (NS)
	(DA)(ASL)	43.79	42	.40				
Effects	Aggr	13.83	4	.006				
Hard Liquor								
Models	(D)(ASL)	54.53	46	.18	(D)(ASL)	32.91	42	.84 (NS)
	(DA)(ASL)	43.51	42	.41				
Effects	Aggr	11.02	4	.03				
Marijuana								
Models	(D)(ASL)	69.49	46	.01	(D)(ASL)	51.63	42	.15 (NS)
	(DS)(DA)(ASL)	37.35	38	.50				
Effects	Shy	15.38	4	.004				
	Aggr	16.76	4	.002				
Cigarettes								
Models	(D)(ASL)	82.61	46	.001	(D)(ASL)	33.07	42	.84 (NS)
	(DSA)(ASL)	41.62	30	.08				
Effects	Aggr	19.06	4	.001				
	Aggr*Shy Interaction	21.93	12	.04				

Figure 2

Aggressiveness in First Grade and Teenage Substance Use by Males

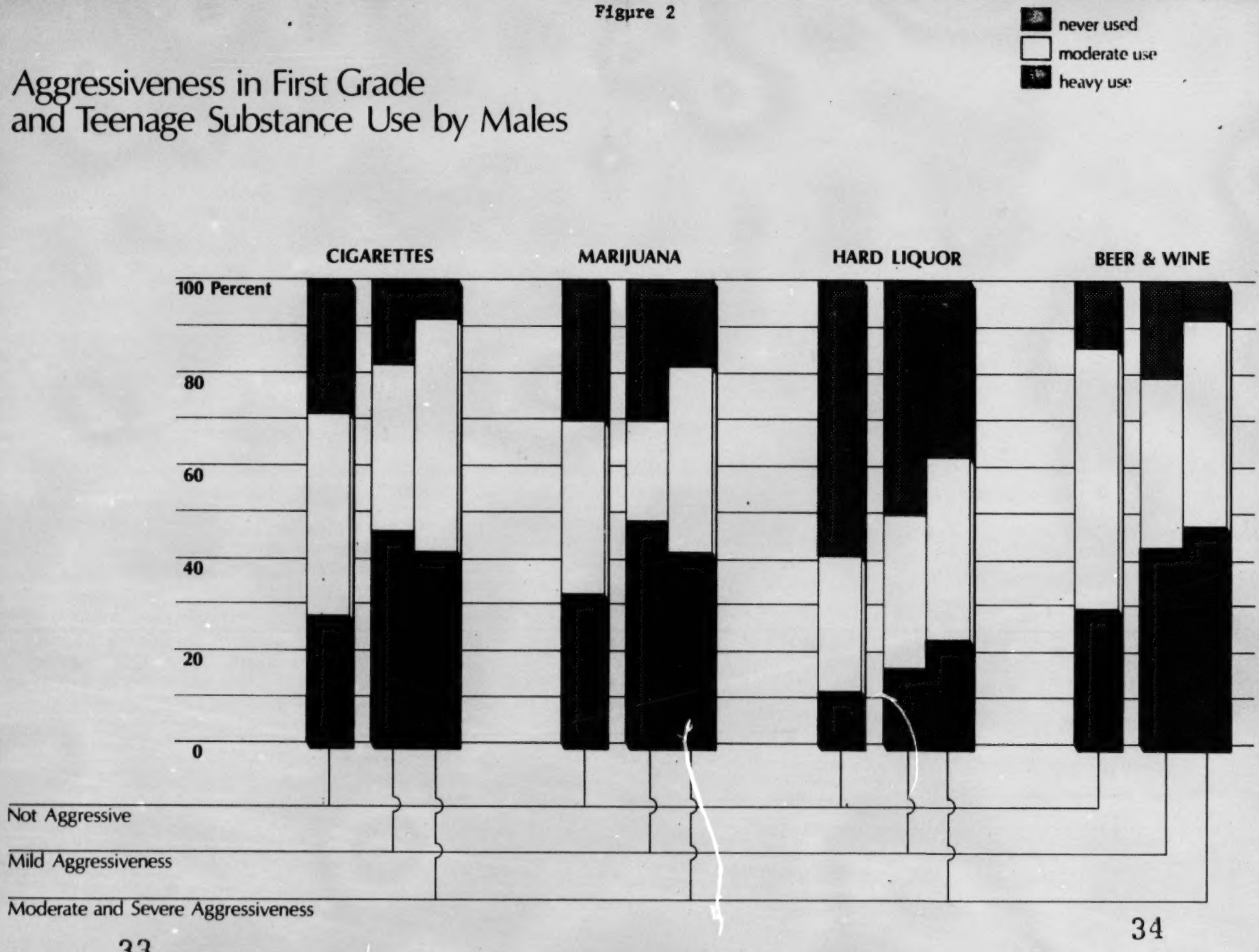
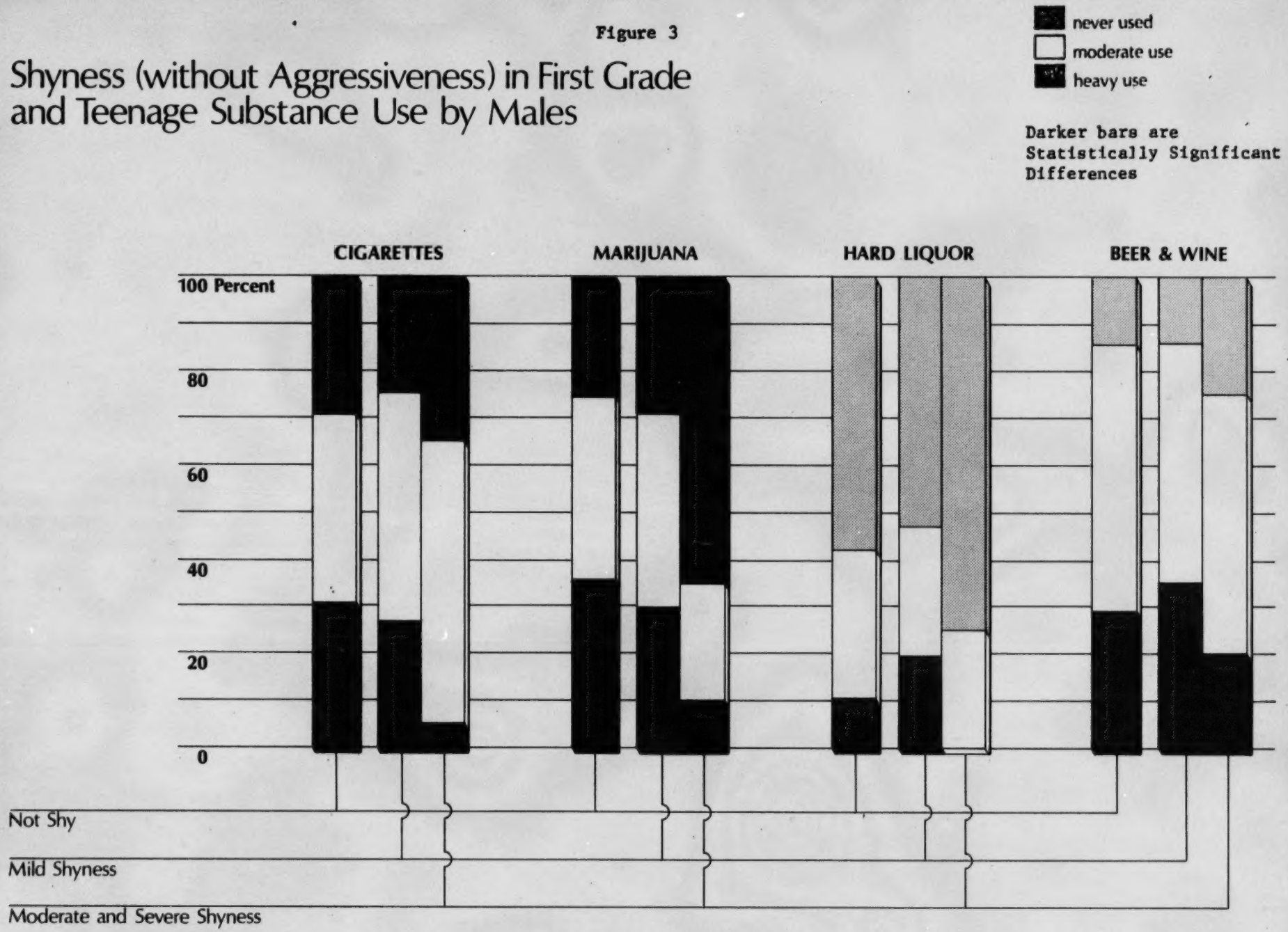


Figure 3

Shyness (without Aggressiveness) in First Grade and Teenage Substance Use by Males



only shy or only aggressive. Shy-aggressive males had the highest percentage of heavy use of three of the four substances. Shyness-aggressiveness had the strongest relationships to cigarette use, but the trends for marijuana and alcohol also support the notion of a distinctive additional risk for the shy-aggressive children.

Figure 4 goes about here

MRT and IQ. First grade MRT and IQ were examined along with the two first grade SAS predictors, aggressiveness and shyness, although these had to be collapsed into two categories due to cell sizes. MRT showed a strong relationship to the use of beer and wine, hard liquor, and marijuana by both males and females (See Figures 5 and 6). The higher the MRT score the more frequent were teenagers reporting heavy use and the less frequent were teenagers who had never tried the substance. No association was found between cigarette use and MRT for either males or females. The similar results for males and females clearly indicate that high MRT children were more likely to use substances other than cigarettes.

Figures 5 and 6 go about here

Psychological Well-Being in
First Grade and Teenage Psychiatric Symptoms

The two first-grade measures of PWB, the Mother Symptom Inventory (MSI) and the Direct Clinical Observation (DCO) both showed relationships to teenage symptoms among females, but not among males

(See Table 5). Among females first-grade MSI predicted teenage anxiety, depression, and overall distress, while signs of symptomatology in the first grade DCO were associated with twice the risk of depression ten years later.

Table 5 goes about here

Psychological Well-Being in First Grade and Teenage Substance Use

Early symptoms alone were not related to substance use among males or females. Among females, as we describe in the next section, MSI did predict substance use in conjunction with learning problems.

The Interrelationship of SAS and PWB from First Grade to Adolescence

Thus far we have considered the separate predictive powers of early SAS and PWB on later outcomes. Next we examine whether the antecedents belonging to the two dimensions of mental health interact with each other in predicting later substance use or symptoms. For instance, we have found that first-grade aggressiveness in males predicts substance use ten years later. One might ask whether this relationship is the same for all males, or whether it operates differently for those exhibiting early psychiatric symptoms. Similarly, while we found very different antecedents of substance use and psychiatric symptoms, since all the measures of early maladaptation are related, one might ask to what extent the substance using population and the symptomatic population overlap. Are both outcomes different aspects of an overall "mental health," or are they empirically, as well as conceptually, distinct?

Figure 4

Shyness and Aggressiveness in First Grade and Teenage Substance Use by Males

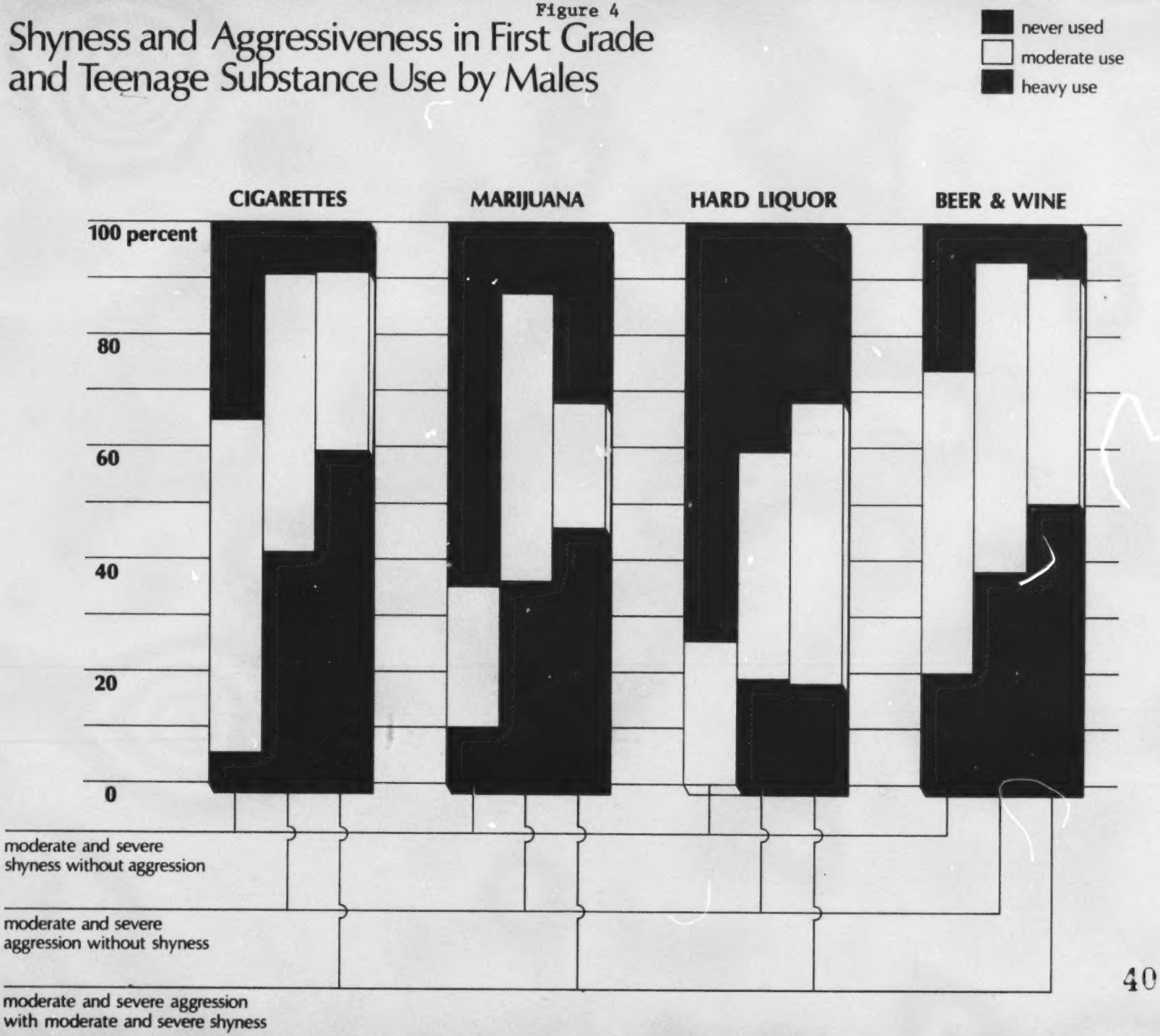


Figure 5

First Grade Readiness Test Scores and Teenage Substance Use by Males

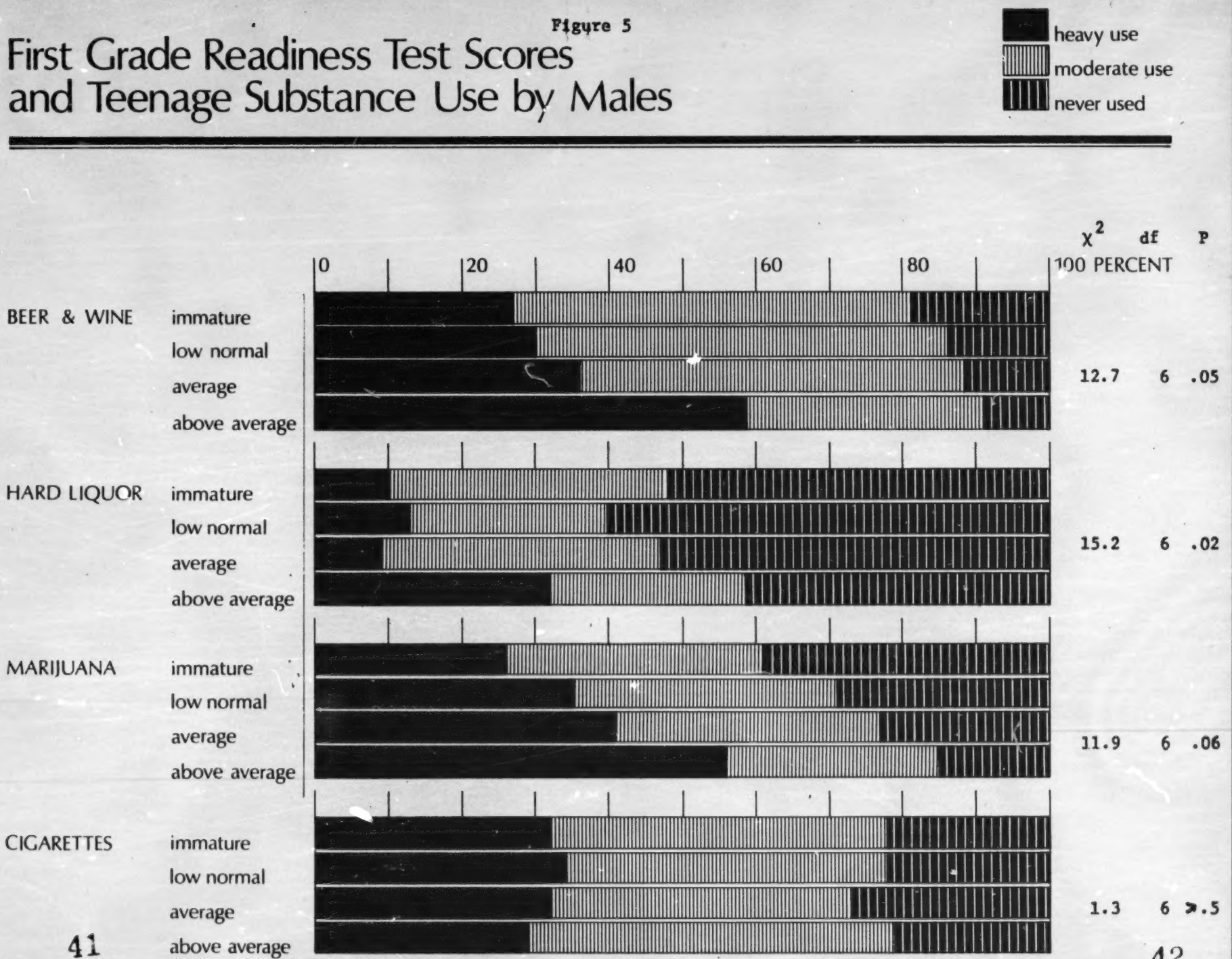


Figure 6

First Grade Readiness Test Scores and Teenage Substance Use by Females

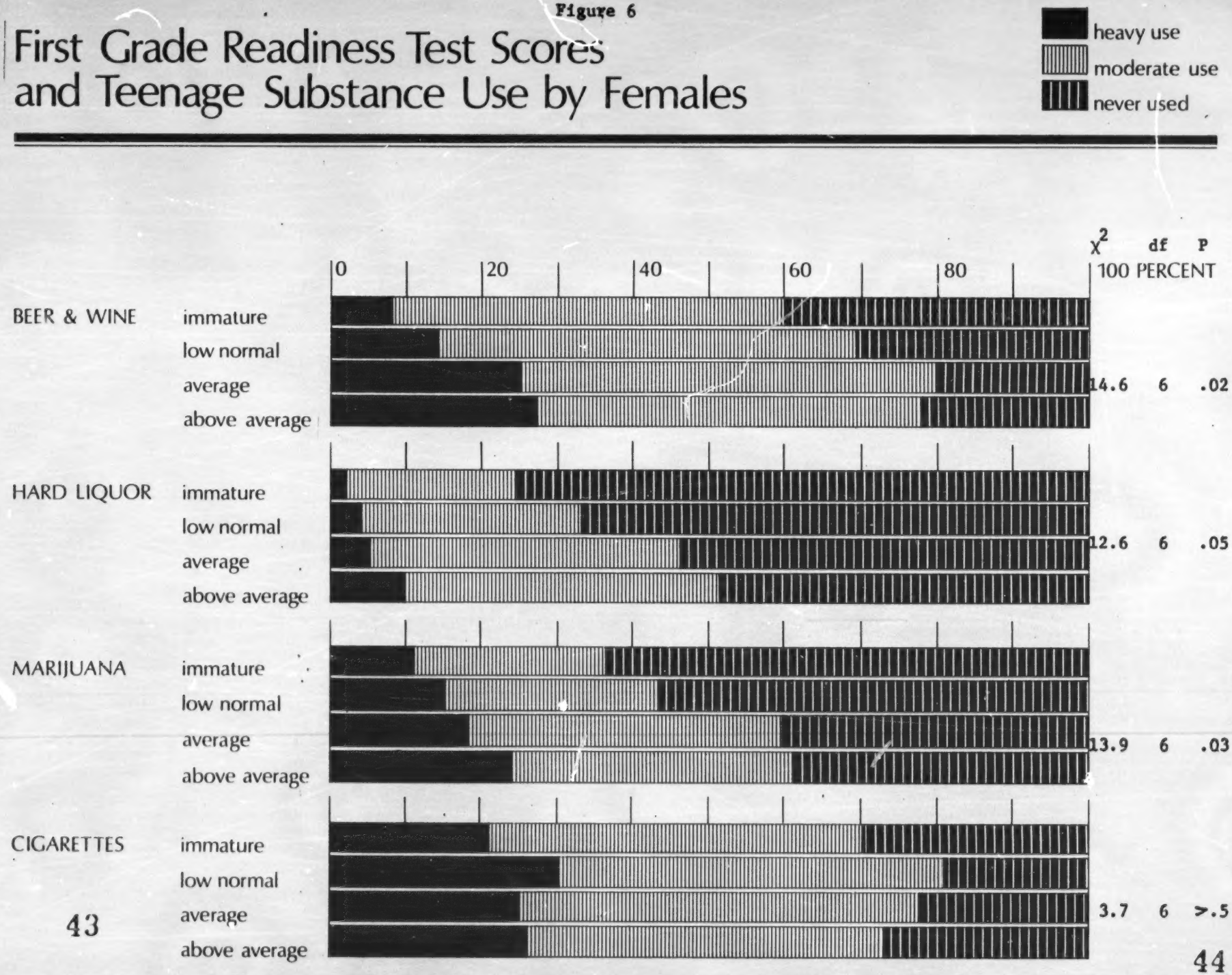


Table 5

Teenage Psychiatric Symptoms Among

Females and First-Grade Symptoms

First-Grade Mother's Symptom Inventory

Teenage Symptoms	None (N=92)	One or two (N=149)	Three or more (N=92)
Anxiety*	19.6**	27.5	41.3
Depression*	22.8	21.5	42.4
Bizarreness	32.6	35.6	34.8
Paranoia	28.3	34.2	33.7
Obsessive-Compulsive	38.0	39.6	47.8
Overall Distress*	19.6	31.5	38.0

First-Grade Direct Clinical Observation

Teenage Symptoms	No signs of symptoms (N=256)	Signs of symptoms (N=22)
Anxiety	30.9	31.8
Depression*	27.7	50.0
Bizarreness	35.2	36.4
Paranoia	33.2	40.9
Obsessive-Compulsive	43.4	45.5
Overall Distress	30.5	40.9

* $p < .05$

** The numbers in the table are the percent of those at each level of first-grade symptoms who were symptomatic as teenagers.

A multitude of analyses showed that the predictive powers of early SAS and PWB are independent of each other. Early PWB has the same effect among socially adapting and maladapting first-graders; early SAS has the same effect among symptomatic and non-symptomatic first-graders. The only exception is in the prediction of teenage substance use among females. In the presence of moderate or severe first-grade learning problems, but not otherwise, symptoms as measured by MSI appear to inhibit the later use of beer or wine, hard liquor, and marijuana. Log-linear analyses of the effects of first-grade SAS measures and MSI confirm that MSI has a different effect at different levels of learning problems. Otherwise, however, specific measures of early SAS and PWB predict specific adolescent outcomes, and these effects are independent of each other.

Furthermore, the two areas of outcome are quite distinct. Table 6 shows that correlations within an outcome area are relatively high (from .23 to .68), while those between the two areas are close to zero or even negative (from -.14 to .15). The adolescent population that uses substances is thus quite different from the population that develops psychiatric symptoms.

Table 6A and 6B go about here

Summary

These findings show that, as early as first grade, there are clearly identifiable antecedents leading to specific outcomes at least as far as ten years in the future. Briefly, the findings are:

1. First-grade learning problems are the strongest predictor of teenage psychiatric symptoms. This effect is clearer for males than females. Learning problems do not predict substance use.
2. Among both females and males scores on first-grade readiness and IQ tests in general lead to fewer psychiatric symptoms but more substance use ten years later. However, the relation of some symptoms to early cognitive performance appears more complex. They show a curvilinear relationship, with the level of teenage symptoms decreasing as one moves from the lowest to average first-grade scores, but increasing with the highest scores.
3. Shyness among first-grade males (but not females) clearly inhibits substance use at age 16 or 17. For both males and females, however, early shyness seems to predict higher levels of at least some teenage symptoms.
4. First-grade aggressiveness without shyness is a strong predictor of increased teenage substance use by males (not by females), but it is not associated with later psychopathology.
5. The combination of shyness and aggressiveness in first-grade males is associated with even more frequent use of substances (especially of cigarettes) than aggressiveness alone.
6. First-grade psychiatric symptoms as measured by both mothers' reports and clinicians' observations predict later symptoms for females but not for males.
7. With one seemingly minor exception the SAS and PWB predictors do not interact in their effects on later substance use and psychiatric symptoms.

Table 6A

CORRELATIONS AMONG CATEGORIES OF SUBSTANCE USE

AND PSYCHIATRIC SYMPTOMS FOR MALE ADOLESCENTS (N=338)

		Beer or Wine	Hard Liquor	Marijuana	Cigarettes	Anxiety	Depression	Bizarreness	Paranoia	Obsessive/ Compulsive	Overall Distress
SUBSTANCE USE	Beer or Wine	1.00									
	Hard Liquor	.63	1.00								
	Marijuana	.61	.52	1.00							
	Cigarettes	.38	.32	.39	1.00						
PSYCHIATRIC SYMPTOMS	Anxiety	-.11	-.08	-.08	.03	1.00					
	Depression	-.11	-.09	-.14	.01	.63	1.00				
	Bizarreness	-.02	.09	.04	.08	.43	.41	1.00			
	Paranoia	-.05	.07	.06	-.01	.36	.41	.44	1.00		
	Obsessive/ Compulsive	-.12	-.01	-.01	.10	.30	.31	.28	.26	1.00	
	Overall Distress	-.11	-.01	-.01	.11	.58	.63	.66	.61	.41	1.00

Average Absolute Value of Correlations	
Among Substance Use	.48
Among Symptoms	.45
Between Substance Use and Symptoms	.07

SUBSTANCE USE

PSYCHIATRIC SYMPTOMS

Table 6B

CORRELATIONS AMONG CATEGORIES OF SUBSTANCE USE

AND PSYCHIATRIC SYMPTOMS FOR FEMALE ADOLESCENTS (N=357)

		Beer or Wine	Hard Liquor	Marijuana	Cigarettes	Anxiety	Depression	Bizarreness	Paranoia	Obsessive/ Compulsive	Overall Distress
SUBSTANCE USE	Beer or Wine	1.00									
	Hard Liquor	.68	1.00								
	Marijuana	.60	.52	1.00							
	Cigarettes	.43	.32	.43	1.00						
PSYCHIATRIC SYMPTOMS	Anxiety	.11	.08	.05	.04	1.00					
	Depression	.11	.14	.03	.08	.68	1.00				
	Bizarreness	.12	.10	.12	.15	.27	.30	1.00			
	Paranoia	.06	.06	.07	.06	.37	.42	.27	1.00		
	Obsessive/ Compulsive	.01	.04	.07	.03	.23	.23	.28	.32	1.00	
	Overall Distress	.08	.10	.08	.14	.57	.62	.57	.58	.43	1.00

Average Absolute Value of Correlations	
Among Substance Use	.50
Among Symptoms	.41
Between Substance Use and Symptoms	.07

SUBSTANCE USE

PSYCHIATRIC SYMPTOMS

8. The two outcome areas of psychiatric symptoms and substance use are empirically as well as conceptually distinct. They are barely correlated among male and female adolescents, and the developmental paths leading to them are very different.
9. There are strong differences between males and females in the developmental paths leading to adolescent outcomes. Early SAS has stronger predictive power for both later SAS and PWB among males (points 1, 3, 4, and 5), while early PWB shows continuity with later PWB only for females (point 6). The measures of cognitive achievement have similar effects for both sexes (point 2).

Discussion

In this paper we have analyzed predictors of two major areas of teenage outcome--substance use and psychiatric symptoms--and found clear specific developmental paths leading to each area. Before discussing the findings about the paths, however, it is worth noting that the way we have measured the outcomes has theoretical significance for the study of development. We have measured substance "use" rather than "abuse" and psychiatric "symptoms" rather than "illness." There is little empirical evidence of the validity of the various criteria used to define abuse, particularly at this stage of life, as opposed to the idea of determining high levels of use compared to the level of use in the population at risk (Kellam, Ensminger, and Simon 1980; Schuster, Renault, and Blaine 1979; Brady 1982).

In the case of the first grade and teenage psychiatric symptom ratings we have analyzed at the level of symptoms rather than diagnostic categories partly to stay as close as possible to the behavioral level

and partly because of the then available instruments and resources. The validity of child diagnostic categories remain uncertain in our view. Longitudinal study of symptoms and social adaptational measures can help us understand the interrelations of symptoms that may form syndromes or diagnostic categories. Evidence for the importance of symptoms can be found in recent studies of hyperactivity by Loney (1980) and Stewart, Mendelson, and Johnson (1973). We are currently examining the psychological and social adaptational components of the attention deficit syndrome to compare the prognostic importance of the diagnostic category to that of the symptoms and SAS measures that together define the syndrome.

The findings of a recent review of the literature on substance use and its relation to psychiatric symptoms also points to the need for further life-span developmental research on the coherence of various observed behaviors, as well as the need to understand the differences between epidemiologic and clinic-attending populations. Schuster, Renault, and Blaine (1979) summarize studies of adults attending drug clinics. Most studies find a high frequency of psychiatric symptoms among this population, while in our data on teenagers in Woodlawn the two outcomes are nearly independent.

There are several possible explanations for this divergence. First, we have as yet only a limited understanding of who comes to clinic for treatment. We do know, however, that the clinic population is far from a random sample of the population with problems. In previous research on the Woodlawn population (Kellam et al. 1981), we found that help-seeking was related not to severity of problems but to some sort of peer or reference group influence. It may be that the

population presenting in clinic is specifically different in the overlap between substance use and psychiatric symptoms. Second, our data deals with adolescents, not adults. As these teenagers mature into adults of the age groups seen in clinic populations, the association of symptoms with heavy drug use may develop. This points to the need for further longitudinal epidemiologic research, following populations from adolescence into the adult stages.

Within the portion of the life span we have studied, however, we have found clear and specific paths leading to substance use and to psychiatric symptoms among the Woodlawn teenagers. These paths show remarkable differences between males and females, as well as some similarities. In a recent paper from our laboratory on predicting delinquency from some of these same antecedents, Ensminger, Kellam, and Rubin (1981) have pointed out that such sex differences are often dismissed by investigators, who either ignore them in the design of their research or choose not to study females when the behavior under investigation is much more frequent among males. Yet the study of these sex differences is important to an understanding of how various predictors function on outcomes as disparate as delinquency, drug, alcohol, cigarette use, and psychiatric symptoms.

The study of early aggressiveness provides an example of the importance of sex differences. A growing number of studies, including our own, have found aggressiveness to be a very important predictor of substance use in adolescents and young adults; many studies of delinquency have also found it to be an important antecedent. Few investigators, however, have paid attention to the substantial observed difference in aggressiveness between the sexes in building theories

about how early aggression functions to produce later delinquency or substance use. Yet aggressiveness, that is fighting and breaking rules, is far more frequent among first-grade males than females. Furthermore, while it is an important predictor of both later substance use and delinquency for males, it has little such effect for females.

Shyness, that is, sitting alone and not socializing with others, has been much less studied than aggressiveness, yet in relation to delinquency as well as to the outcomes analyzed in this paper, it is an extremely important maladaptive behavior (Ensminger, Kellam, and Rubin 1982). The frequencies in first grade of shyness are quite similar for males and females; yet, like aggressiveness, shyness does not have the predictive power for females that it does for males. No theory can be considered complete unless it explains these dramatic differences between males and females.

To explain these differences, we must first note that shyness and aggressiveness are not opposite ends of the same scale. There are a considerable number of children in the Woodlawn population whom their teachers rated both shy and aggressive: they sit alone and do not socialize, but they fight and break rules. This combination does not result in an average of the two effects, but rather in an enhancement of the effect of aggressiveness, particularly for substance use.

In the analyses of Woodlawn data we have not been able to find the origins of shyness and aggressiveness in the social fields of the family or of the school. Social maladaptation to school generally is strongly related to the characteristics of family structure and atmosphere. The particular quality of the maladaptation (i.e. whether the child demonstrates shyness, aggressiveness, or learning problems in the

classroom) has not been found to be clearly associated with any specific characteristics of the social context. Tendencies to fight or to withdraw in the face of social task demands may precede entry into the first-grade classroom. Such tendencies could be determined by genetic endowment, by early development, socialization, or all three. More work needs to be done to sort out these causes.

Once the child demonstrates shyness or aggressiveness in first grade, however, the consequences appear quite different for males than for females. The natural raters in school and other social fields may respond quite differently to females and males who are shy or aggressive. Society, as exemplified by parents, teachers, and peers, tolerates and may even reinforce aggressiveness in males but not in females. This could then result in both a higher frequency in first grade of aggressive behavior among males and a greater continuity of first-grade aggressiveness in males with later aggressive or delinquent behavior and substance use.

We have also hypothesized in other papers that the differences in predictive importance of shyness may stem from the different social demands placed upon male and female children. The childhood peer groups of males and females are quite different. Male peer groups have greater stability and role definition, while female peer groups characteristically consist of a relatively fluid group of a few close friends (Maccoby and Jacklin 1974). Shyness may well disconnect the male from his peer structure, and hence from the peer influence and values that seem to have greater developmental significance for males than females.

Psychiatric symptoms of distress as reported by the teenagers at age 16 or 17 also come from different sources for the males than for females. For the males, being rated by teachers as having trouble learning and being a low scorer on the school tests resulted in twice the probability of being among the most severely symptomatic ten years later. In contrast, early psychological well being of the males had no relation to teenage psychological well being.

For females, however, although early success in school did have some impact on later psychological well being, the strongest relationships were the links of early psychological distress to later psychological distress. Furthermore, in another study of the same children, we found no aspect of early or evolving family structure or atmosphere that predicted psychological distress among teenage males, while both the mother's early psychological well being and expectations of level of education for her daughter predicted the daughter's teenage psychological distress (Kellam, Simon, and Ensminger in press).

Males in this ghetto community appear to be affected by their success or failure in the main social tasks of school early in life, i.e. learning, socializing in the classroom and peer group, and dealing with authority and rules. Females appear to be affected more by their earlier internal psychological status and their relationships to their mothers.

One strong similarity we found between the sexes was that the cognitive measures predict substance use for both. Further analyses, not reported here, have shown to what this effect may be attributable. The measure of substance use analyzed in this paper was of lifetime frequency rather than first use or current use. Fleming, Kellam, and

Brown (1982) have shown that high scores on the early cognitive measures lead to earlier first use of substances, which may explain the heavier lifetime use. First-grade children who score higher on readiness for school and IQ tests appear not only to have been readier than other children for first grade, but also readier during adolescence to try tobacco, alcohol, and drugs.

These data, over this portion of the life span of these children, may display the very important interplay between inborn genetic characteristics predisposing the children to certain social adaptational responses to social task demands, and the social consequences and responses to such behavior for both the child and society. This research on the early portion of the life span points to the need to go further in tracing the antecedents backward to their biological and social sources and forward into their outcomes in adulthood. Such antecedents must be examined under systematic experimental conditions in the laboratory to confirm their real functions in causing and sustaining both symptoms and substance use.

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